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THE USE OF A SIMPLE FORECASTING TECHNIQUE DURING AN INTERACTIVE COMPUTERIZED BUSINESS GAME

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ABSTRACT

This paper presents a planning and forecasting technique utilized by students playing a computerized business game in a New Product and Pricing class. The implementation of the procedure during the planning technique is explained for each stage in the process. Actual student results are examined and reviewed.

INTRODUCTION

Forecasting is an attempt to foresee the future by examining the past [1, p. 420]. There are many and diverse methods of forecasting. In numerous firms the entire process is subjective, involving seat-of-the pants methods, intuition and years of experience [9, p.75]. Other methods are more complex [7] [8]. Applied forecasting methods received their start in econometric modeling [6] Today's forecasting techniques have evolved to the more common ones businesspeople are familiar with, such as, smoothing [3] and the Box Jenkins method [2]. Writers of books on the use of forecasting classify them into three types: 1) judgmental, 2) time- series, and 3) causal [10, p.609]. The forecasting method presented in this paper is time series by nature. The variables to be forecasted are the ones incorporated into a company's Profit and Loss Statement. Another example of this type of Profit and Loss forecasting is found in Gross and Peterson [5, pp. 12-15].

Examples of forecasting, planning and decision support systems are numerous in ABSEL papers. The work of Sherrell, Russ and Burns [11] also Shane and Bailes [10] was very informative and has stimulated my imagination for a subject for next year's ABSEL conference.

The purpose of this paper is to present a forecasting and planning technique used during a computerized business simulation game. The potential benefactors of this paper include I) modelers of future simulation games and 2) administrators of business games. Therefore, this planning and forecasting technique with its procedure will be presented to provide a forum for critique, modification, improvement and information dessimjnatjon to ABSEL members.

The value of the forecasting and planning technique is to provide a versimilitudinal experience for the students participating in the Business Simulation. The ultimate goal is to have students learn a planning technique. In order for the students to be successful in the computer game they must be good record keepers, planners and forecasters.

Forecasting and Planning Procedure

The procedure used for the playing of the computer game consists of five parts: 1) Week one is used to explain the simulation game. Students decide on their preliminary input variables for game #1 . 2) Week two is the playing of game #1 and the collecting of its data. This is worth 50% of the student's grade. 3) Week three is the analysis of all the data forms gathered during game #1 and the planning and forecasting of the variables for the second game., 4) Week four is the playing of the second computer game worth 20% of the student semester grade. 5) Week five is for the debriefing of the game. Included in the game debriefing are anonymous student examples of the most excellent and the worst data analysis , planning and forecasting techniques. A review of the teaching/learning objectives for the game is given by the game administrator. This is followed by an open-end class discussion on the game.

During week 1 the game is explained. "Tommie Company" is a computer simulation used as a business game in a New Product and Pricing class. The game is Interactive in nature. Ten teams simultaneously play the game on computer terminals entirely during a two hour period. The teams are interacting with other teams and the computer in semi-real time. The results (profit and loss) of a team's decision inputs (marketing variables) are affected by the entire 10 teams acting collectively (industry averages for price, promotion and product quality). There are five products in the business game, each with its own distinct product life cycle and demand functions.

The learning/teaching procedure is to play the exact same business game twice. The first game is worth 5% of the student's grade. The second time a student participates in the simulation, the game is worth 20% of the final grade. The amount of money needed for a 100% grade for the first. game is $100,000 or more. The second game requires a $200,000 or more amount for a

perfect 100% score. The entire process of playing the two games should be thought of as 1) a test marketing situation, (game 1, with record keeping) 2) forecasting from the results of the market test (analysis and planning) and 3) Nationwide rollout (game 2, worth 20% of a student's final grade).

The class size is usually 25 marketing majors meeting on a Tuesday, Thursday schedule for a 1 hour 15 minutes class each day. (Three semester hours of credit) This is perfect for playing the game one hour on Tuesday and one hour on Thursday. There is just one section offered per semester. It is a New Product and Pricing class and is required for all marketing majors. There are ten teams participating in the computer game. Two or three students comprise a team. The game has been played for 25 semesters.

it is week 2 and students play the game and collect data. Exhibit 1 illustrates the data collection form used by the students during the initial two hour simulation. For purposes of simplicity, only Alpha will be discussed as the main example. The other products in the simulation, Beta, Gamma, Sigma and Omega represent distinct products with their own product life cycles, demand

curves, product quality responses, promotional functions and market research scenarios. However, all five products are subject to the same forecasting and planning procedure described in this paper.

The amounts illustrated for example purposes in Exhibit 1 are mostly self-explanatory. The key points are demand is at a rate of 30 units per week (60/2 weeks) during this very exact period of the game. 2) Inventory=zero. and, 3) Rate of profit=$400/2 weeks, or $200 per week. There is no cost for distribution. The product quality index is between 80-120. The higher the PQI, the higher will be the cost of goods sold and the demand for the product. Most student teams take a Profit and Loss Statement every 2-4 weeks during the 100 week simulation. This results in *25-50* data collection forms, exhibits l's, being documented by each student team during computer game #1, week two.

Combining each of the separate exhibits for Alpha, results in the graphic displayed in Figure one. As is noted from the data, Alpha's demand started for this team at a rate of 10 units per week, increased to 20 units and was 30 units per week for weeks 10-12. Weeks 10-12 represent the data presented in Exhibit 1, Stardate 720 through the Stardate 864 period. In other words, Figure 1 is the graphic representation of the Alpha product life cycle for a designated time period during Alpha's total product life cycle. Students continue to plot all five products for the entire 100 week simulation.

So far the discussion of the forecasting procedure has been on the pre-game information, the game itself with the data collection, and the plotting of the data. This is analogous to the before and during stage. It is now Week Three, the analysis stage after game one. Referring to Figure 1, demand for Alpha reached 40 units during weeks 13-16. But what should have the demand been per week? What was the demand potential per week? According to the pre-game scenario, Alpha was to have a constant demand rate from week one through twenty. But this did not occur for the team. The team underestimated demand for the product and distributed too small of an amount per week. Referring to Exhibit 1, inventory was at zero. All that was shipped was sold.

Therefore, when doing an analysis and forecast for game 2, this team should distribute, for weeks 1-16, a rate per week of 40 units. Of course, computer game 2 will not yield the exact results of game 1 because of its interactive nature. The other teams playing the simulation will affect the industry average, which will affect the team's demand per week. It is probable for the demand to be in the 35-45 unit range.

EXHIBIT I

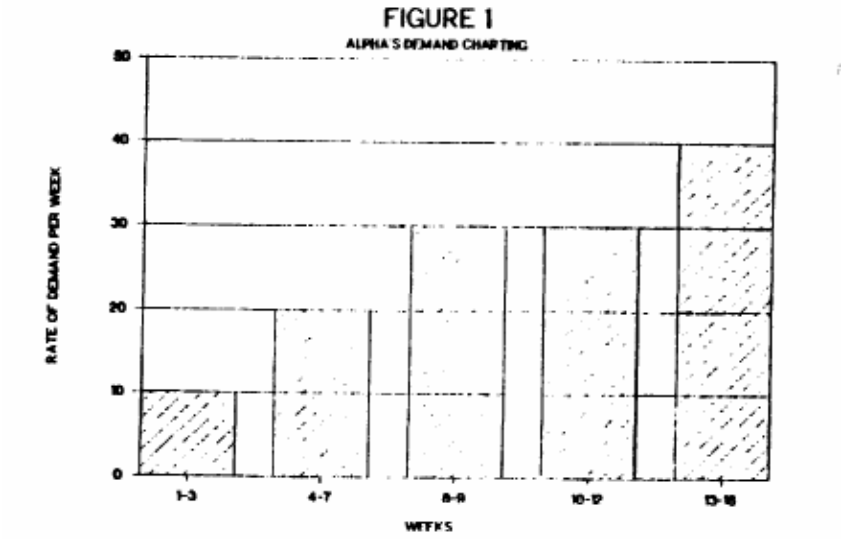
Data Collection Form

	ALPHA	BETA	GAMMA	SIGMA	OMEGA
Price	20				
Demand	60				
Sales	1200				
CGS	600				
Prom	200				
Dist	30				
PQI	80				
Inv	0				
Profit	400				

Stardate 864, It has been 2 weeks since the last P & L.

Code: 72 Stardates = 1 week
7200 Stardates = 100 weeks, 1 second = 1 stardate, therefore 7200 stardates = 2 hours of real wall clock time while simulating the game on an interactive terminal.

FIGURE 1

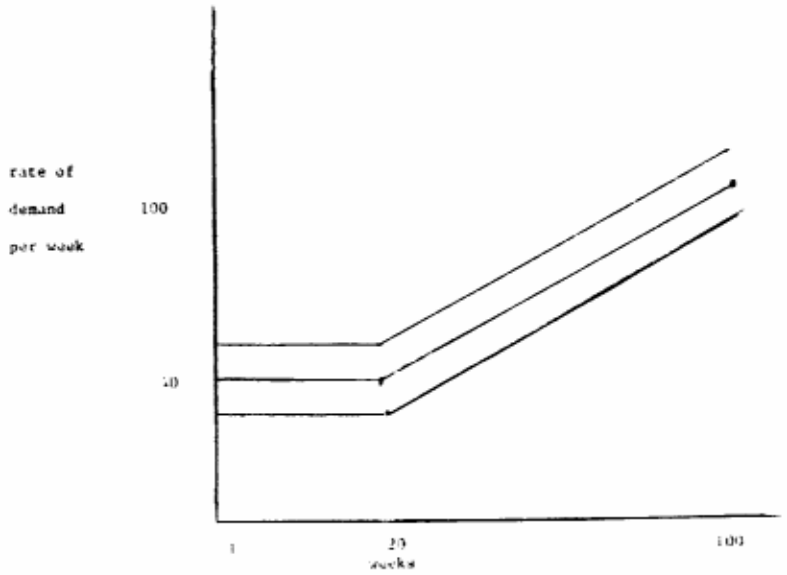


This is superior than just estimating demand at 10 units per week. As Clarke has noted, "The forecast does not try to describe the future, but to define the boundaries within which the possible futures must lie. If we regard the ages which stretch ahead of us an unmapped and unexplored country, what one is attempting to do is to survey its frontiers and to get some idea of its extent. The detailed geography of the interior must remain unknown until we reach it. [4, p.12]"

This is the intention of the game, to have the students forecast an amount that will not be exact, (cannot be exact because of new industry averages) but will be within a boundary. Figure 2 illustrates this boundary type of logic. The middle line is the derived forecast using the straight line method. The upper and lower lines are the probable boundaries for average student teams. During the course of game two any team will most likely reach both *the* upper and lower limits of the boundary. This is partially due to their own limitations, such as mistakes and to the volatile industry averages for price, promotion, and product quality.

Figure 2

Alpha's Partial
Product life cycle



It should be remembered that Alpha has been a very simple example with nice round numbers in weeks and units. In reality, the students data collection forms, when plotted, grow into dynamically wrinkled curves. But a trend line is still in evidence for most of the students. For the other four product life cycles being simulated: Beta sales are radically downward and exponentially upward, Sigma goes slowly downward and Omega is equated to be a perfectly straight horizontal line but never exactly appears to be because of industry averages. The five products with their salient variances offers for the student a more challenging and rewarding game experience.

Finally then, students are required to forecast their game # two's 25 profit and loss statements. Included for each P & L statement are forecasted amounts for demand, sales, price, cost of goods sold, promotional rate, inventory, shipping and rate of profit per week.

Results

The described forecasting procedure has evolved through time, semester by semester. When the game was first developed, the game administrator said nothing of record keeping, analysis and forecasting. In this situation only the BEST students independently realized record keeping could enhance their score for game two. This was their secret. Then gradually through the semesters, the game administrator began to suggest, strongly suggest, then taught how to do the forecasting procedure and finally implemented the forecasting technique as a mandatory requirement.

Table 1 presents a sampling of student scores. Teams 1-7 were from the summer of 83. Notice there is not always ten teams each semester. Teams 8-16 were from fall 84 and Teams 17-24 from summer 85. Teams 25--34 are from the Fall '86 semester with the mandatory forecasting requirement.. Unfortunately, even after the game administrator stressed the importance of the situation, only 4 teams actually collected data on unit demand and profit and loss statements during game one. During the Spring '87 semester all the students will be guided through the procedure. No attempt will be made to statistically analyze these numbers now because of the small sample size. Generally, students are doing better with the forecasting and planning technique than they were doing without it.

Table 1

Student Game Results

Team	Game 1	Game 2	Team	Game 1	Game 2
1	124	161	17	-211	15
2	92	176	18	43	199
3	14	59	19	41	162
4	37	66	20	81	215
5	141	180	21	- 27	205
6	81	146	22	60	245
7	168	137	23	-149	85
8	22	100	24	-124	90
9	49	75	25	14	106
10	14	129	26	-138	203
11	42	209	27	45	-32
12	-53	95	28	52	111
13	45	121	29	127	127
14	- 1	-63	30	- 46	174
15	30	77	31	42	33
16	19	88	32	-100	72
			33	- 23	138
			34	203	155

Amounts are in thousands of dollars.

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